

REMARKS

Claims 1-26 are presented for examination. Claims 1-6 and 9-26 have been amended to define still more clearly what Applicant regards as his invention. Claims 1, 14, 17, and 20 are independent.

Initially, Applicant thanks the Examiner for supplementing the remarks in the originally mailed Office Action, relating to the rejection of Claims 15-19 and 21-26.

Replacement sheets of drawings including changes to Figs. 2 and 3 are attached hereto and replace the original sheets including Figs. 2 and 3. The changes to Figs. 2 and 3 are now explained in detail.

Fig. 2 has been amended, first, by changing "Partial Result Reg. 108" to --Partial Result Reg. 109-- in order to be consistent with the description (e.g., see page 7, line 12). Second, "External buffer 106" has likewise been changed to --External buffer 107-- (e.g., see page 6, line 17).

Fig. 3 has been amended as follows. First, step "300" has been changed to step --301-- in order to be consistent with the description (e.g., see page 9, line 3). Second, a new reference numeral --300-- and a corresponding lead line have been inserted generally to indicate the overall method in Fig. 3 to accord with the description at page 8, lines 22-23. Third, in step 306, "read" has been changed to --Read--. Fourth, in step 310, "M.B = K" has been changed to --M.K=K'-- in accordance with the description at page 9, line 12. Fifth, in step 312, "In" has been changed to --in--. Sixth, in step 318, "In" has been changed to --in--.

Claims 1-26 were rejected under 35 U.S.C. § 103(a) as being obvious from U.S. Patent 6,389,417 to Shin et al. in view of U.S. Patent 5,802,369 to Ganesh et al.

Claim 1 is directed to a method of wavelet filtering a digital image which comprises a plurality of pixels, the method being performed for each of one or more bands of pixels. A plurality of previous partial results is retrieved from a local storage or a remote storage. The plurality of previous partial results comprises a pixel and a coefficient (support for this feature is found in the present specification, at least at page 6, lines 21-29, and page 7, lines 23-26).^{1/} The local storage has a greater bandwidth than the remote storage (support for this feature is found in the present specification, at least from page 7, line 21, to page 8, line 3). A current group of adjacent pixels is inputted in a current band. The method computes coefficients and a plurality of current partial results utilizing the current group of adjacent pixels and the plurality of previous partial results (support for this feature is found in the specification, at least from page 5, line 15, to page 6, line 29). The plurality of current partial results comprise a pixel and a coefficient (support for this feature is found in the present specification, at least at page 6, lines 21-29, and page 7, lines 23-26). The coefficients are outputted. The plurality of current partial results is stored in the local storage if the current group of adjacent pixels is not the last group in the band, or in the remote storage if the current group of adjacent pixels is the last group in the band (support for this feature is found in the present specification, at least from page 4, line 30, to page 5, line 7; page 8, lines 22-26; and page 9, lines 5-11).

Shin et al., as understood by Applicant, relates to a method and apparatus for searching a digital image in a region-based manner. More particularly, Shin et al. relates to searching a digital image using characteristics such as the color and texture of the

^{1/}It is of course to be understood that the references to various portions of the present application are by way of illustration and example only, and that the claims are not limited by the details of the embodiments referred to.

digital image (see column 1, lines 5-10). At column 1, lines 29-31, it is stated that it is an object of Shin et al. “to provide a digital image searching apparatus for performing a region-based search,” while lines 32-34 state that it is another object of Shin et al. “to provide a digital image searching method that utilizes a region-based search.”

At column 4, lines 37-45, Shin et al states: “The digital image search apparatus according to the present invention segments the database image into regions and region-based searching is performed by means of segmented regions. Since the user performs searching after selecting the characteristic and the position of the segmented region, it is possible to perform searching work more rapidly and effectively than in an apparatus according to a conventional technology in which the searching is performed with respect to the entire image.” Column 5, lines 22-30, contains similar statements about the digital image search method.

According to Applicant’s understanding, the entire Shin et al. patent appears to be directed to a method and an apparatus for searching a digital image using region-based searching. This involves segmenting an image from a database or an image not stored in a database into homogeneous regions (see column 3, lines 21-27), analyzing the segmented regions (see column 3, lines 28-52), and storing the segmented regions. The region characteristic analysis involves characteristics such as color, texture, and shape of a segmented region (see column 3, lines 28-31) and produces output characteristic data such as a color histogram, Gabor wavelet coefficient, boundary description, and a position value for each image and region (see column 3, lines 46-52). An image search engine searches for an image having a segmented region showing a characteristic similar to the characteristic of a query region.

According to Applicant's understanding, the only information in Shin et al. dealing with wavelets are general statements about a Gabor wavelet coefficient, e.g., a region characteristic analyzing unit 144 outputting characteristic data such as the Gabor wavelet coefficient (see column 3, lines 45-49). Applicant submits that such general remarks do not amount to a teaching or suggestion of the features of wavelet filtering recited in Claim 1. Nothing has been found in Shin et al. that would teach or suggest a method of wavelet filtering a digital image, where the pixels of the digital image are processed in bands of pixels, as recited in Claim 1.

Shin et al. apparently discusses homogeneous segmented regions for searching, but fails to teach or suggest wavelet filtering pixels/coefficients in bands of the image. On the contrary, Claim 1 recites that a digital image is processed in bands of pixels, with the filtering applied to each band (for example, see the present specification from page 4, line 28, to page 5, line 4).

Furthermore, Applicant has found no teaching or suggestion in Shin et al. of partial results comprising a pixel and a coefficient, as recited in Claim 1. These are the "partial results" stored in the local or remote storage. Likewise, Applicant has found no teaching or suggestion in Shin et al. of previous partial results being retrieved from a local or remote storage where the local storage has a greater bandwidth than the remote storage, as recited in Claim 1 (for example, see the present specification at page 7, lines 25-26).

Applicant has also found no teaching or suggestion in Shin et al. of inputting a current group of adjacent pixels in the current band, as recited in Claim 1. Applicant submits that Shin et al. discusses neither bands nor groups of pixels, but merely refers to homogeneous segments. Claim 1 recites that coefficients and current partial

results are computed utilizing the current group of adjacent pixels in the current band and the previous partial results. Again, the current partial results comprise a pixel and a coefficient in Claim 1. Applicant submits that nothing in Shin et al. would teach or suggest this feature. Still further, Applicant submits that Shin et al does not teach or suggest storing the current partial results in the local storage if the current group of adjacent pixels is not the last group in the band, or in the remote storage if the current group of adjacent pixels is the last group in the band, as recited in Claim 1.

Ganesh et al., as understood by Applicant, relates to an energy-based wavelet system and a method for signal compression and reconstruction). More particularly, Ganesh et al. apparently relates to a system and method for processing a signal by compressing and reconstructing the same, in which wavelets are selected at various levels of a wavelet decomposition tree used to model the signal based on the mean energy at each level of the tree. Ganesh et al. apparently deals with acoustic signals, and more particularly sonar signals; for example, column 2, lines 50-55, discusses undersea applications such as sidescan sonar images and under water acoustic signals, noise and interference. The figures illustrating the apparatus, the method and test results apparently all relate to acoustic sources (e.g., see Figs. 2, 4A, 4B, and 6). Also, column 9, lines 36-62, discusses zooming in on a segment of a porpoise signal reconstruction.

Applicant submits that Ganesh et al. is entirely silent as to digital images. Therefore, Applicant submits, Ganesh et al. does not teach or suggest a method of wavelet filtering a digital image, where the pixels of the digital image are processed in bands of pixels, as recited in Claim 1.

Furthermore, Applicant submits that there is no teaching or suggestion in either Shin et al. or Ganesh et al. to combine the two references. Moreover, Applicant submits that combining the disclosure of a digital image searching apparatus or method for performing a region-based search, with a system or method for processing an acoustical signal in which wavelets are selected at various levels of a wavelet decomposition tree based on the mean energy at each level of the tree, would not teach or suggest the method of Claim 1 of wavelet filtering a digital image which is processed in bands of pixels.

Accordingly, Applicant submits that Claim 1 is clearly allowable over Shin et al. and Ganesh et al., whether considered separately or in any permissible combination (if any).

Independent Claims 14, 17, and 20 each include features similar to those discussed above in connection with Claim 1. Accordingly, Claims 14, 17, and 20 are believed to be patentable for at least the same reasons as discussed above in connection with Claim 1.

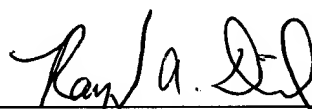
A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Ray A. DiPerna", written over a horizontal line.

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